



WATER QUALITY OF FRESHWATER LAKE, GULBARGA DISTRICT, KARNATAKA

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ABSTRACT

The present study reports the water quality of freshwater lake, Gulbarga District, has been studied for a period of One year from October 2015 to September 2016. The physic-chemical parameters such as, temperature, pH, dissolved Oxygen, free Carbon dioxide, hardness, Calcium, Magnesium, Chloride, Alkalinity, Phosphate were analysed and the results indicate that, water quality of lake is within the limits and showed seasonal variations in their concentrations.

KEYWORDS: freshwater lake, Gulbarga, Physico-chemical parameters.

INTRODUCTION:

Fresh water ecosystems are important component of earth which responds to ecosystem alterations rather rapidly. It is due to the fact that, the aquatic ecosystems and aquatic organism play a key role in the turnover of organic matter and energy through the ecosystem (Deshmukh and Kanchana, 2004). Aquatic ecosystems health is known to react to different types of water pollution. This reaction is very rapid because of relatively high sensitivity and high diversity of organisms (Rajdeep Dutta *et al*, 2005). Aquatic ecosystems are play a vital role in maintenance of ecological balance by performing various activities. Many of aquatic ecosystems are under threat due to the various anthropological activities such as industrialization, over utilization of fertilizers, over exploitation of fishers, urbanizations and unplanned use of water resources. However work and overview on ecosystem and life of freshwater ecosystem studied by several investigations. (Sharma and Michel, 1980, 1987; Sehgal, 1983; Sharma, 1996) Ugade *et al* 2005.

MATERIAL AND METHODS:

Sharanabasaveshwara lake is situated in the heart of Gulbarga city and. It is 5 kms away from the Gulbarga University, Which acquires the land of 85.8 hectare and used for recreational purpose

The physico-chemical parameters were estimated as per the Standard Methods (APHA, AWWA and WEF 1998).

RESULTS AND DISCUSSION:

The results of surface water analysis are given in table-1 during the study period.

Temperature

Temperature is a very important parameter in the determination of DO, CO₂, bicarbonates and determination of pH and also important for effect of certain chemical and biological reactions.

Temperature is basically important for certain chemical and biological reactions, which takes place in organisms inhabiting media. The atmospheric and water temperature varies at different times of the day and different season. The higher temperature atmospheric and water was observed during summer season. The fluctuation of atmospheric and water temperature were almost similar trend was observed. It must be possible due to the presence of cloudy weather (Uyeno, 1996).

In the present study, atmospheric temperature has shown the positive significance with water temperature ($P<0.01$), dissolved oxygen ($P<0.01$), chloride ($P<0.01$).

Water temperature has shown the positive significance with atmospheric temperature ($P<0.01$), pH ($P<0.01$), dissolved oxygen ($P<0.01$), total dissolved solids ($P<0.01$).

pH

The pH is scale to denote whether water is acidic or alkaline. pH is the negative logarithm parameter. The permissible limit of pH of water is 6.5 to 9.2. Hydrogen ion concentration is an important chemical factor, which is linked with all process of life and also influences the colonization of aquatic macro fauna in the water body. pH of water regulated by CO₂ and bicarbonates according to Hutchinson (1957 and 1967). In the present study, the higher concentration of

pH was observed during summer season could be attribute due to enhanced rate of evaporation coupled with human interference and partly due to enhanced photosynthetic activity.

pH has shown the positive significance with water and atmospheric temperature ($P<0.05$), water temperature ($P<0.05$), magnesium hardness ($P<0.05$), total dissolved solids ($P<0.05$).

Dissolved oxygen

Oxygen is one of the several dissolved gases important to aquatic life. It is a primary and comprehensive indicator of water quality. The seasonal variation of oxygen in water depends upon the temperature which influences its solubility. On the other hand, Hutchinson (1967) pointed out that dissolved oxygen super saturation in water is mainly due to the photosynthetic activity of phytoplankton.

Dissolved oxygen values were high during summer season may be due to increased solar radiation and thus a considerably good standing crop of phytoplankton. Primary sources of oxygen in surface water are photosynthesis of aquatic plants, algae and diffusion of atmospheric oxygen across the air water interface (Deas and Orlab, 1999).

Dissolved oxygen has shown the positive significance with atmospheric and water temperature ($P<0.01$), calcium hardness ($P<0.01$), chloride ($P<0.01$).

Free CO₂

The CO₂ associated with respiration. In aquatic system, sources of carbon dioxide are community respiration and decomposition, while it is consumed in the photosynthesis. Depending on the pH and other biological conditions, the carbon dioxide are found in any one of the three forms i.e. free CO₂, carbonic acid and bicarbonates. It is interesting to note that the values of free CO₂ increases, the value of total alkalinity decreases. Such inverse relation is also noticed between CO₂ and O₂. In present study, free CO₂ was high in northeast monsoon season due to less photosynthetic activity.

The free carbon dioxide has shown the positive significance only with the water temperature ($P<0.05$).

Total hardness

Water hardness is the traditional measure of the capacity of the water to react with soap, hard water require a considerable amount of soap to produce lather. Hardness of water is not a specific constituent but is variable and complex mixture of cation and anion. It is caused by dissolved polyvalent metallic ions dissolved in water.

In the present study, the concentration of total hardness is high during summer season. The hardness increase in the summer season low due to level of water (Shukla, 1992). Deshmukh and Kanchan (2004) also observed higher values during the same season.

The hardness has shown the positive significance with calcium hardness ($P<0.01$), chloride ($P<0.01$), phosphate ($P<0.01$), total dissolved solids ($P<0.01$).

Calcium and Magnesium hardness

Calcium and magnesium are the important sources of the water. The calcium and magnesium are mainly comes from natural water from bleaching of rocks.

Calcium in an aquatic environment is an important macronutrient. The calcium and magnesium hardness reduces the utility of water for domestic use. Lund (1965) suggests calcium main effect on phytoplankton to be the buffering the pH of water. The magnesium is also essential nutrient for growth and development of plant. The calcium and magnesium hardness recorded high in the summer season in present study. It is due to evaporation of water (Shukla, 1992).

Calcium has shown the positive significance with the dissolved oxygen ($P<0.01$), total hardness ($P<0.01$), magnesium hardness ($P<0.01$), chloride ($P<0.01$).

Magnesium hardness has shown the positive significance with the calcium hardness ($P<0.01$), chloride ($P<0.05$), phosphate ($P<0.05$) and total dissolved solids ($P<0.05$).

Chloride

Chloride is an anion is generally present in the natural waters and waste waters. The presence of chloride in natural water can be attributed to dissolution of salt deposits, discharges of effluents from chemical industries sewage discharges and irrigation drainage. High chloride content also has deleterious effect on metallic pipes and structure as well as an agriculture plants (NEERI, 1988). From an environmental point of view, chloride is basically a conservator parameter and may serve as an index of pollution occurring in natural freshwater. Munawar (1970), based on his limnological work concluded that the higher chloride content indicates higher degree of pollution in water.

In the present study, the chloride concentration was high in summer season. Gonzalves and Joshi (1946) opined that chloride level increases in the summer season when the water is low. In present investigation, the chloride level is high in summer due to high rate of evaporation.

Chloride has shown the positive significance with the atmospheric temperature ($P<0.01$), dissolved oxygen ($P<0.01$), total hardness ($P<0.01$), calcium hardness ($P<0.01$), phosphate ($P<0.01$).

Total alkalinity

Alkalinity is the quantity of ions in water that will react to neutralize hydrogen ions, alkalinity is thus a measure of the ability of water to neutralize strong acids. The constituents of alkalinity in natural system mainly include carbonate, bicarbonate and hydroxide. These constituents result from dissolution of mineral substance in the soil and atmosphere. The role of alkalinity in the determination of productive capacity of aquatic environment has been described by Phillipose (1959).

In the present investigation the total alkalinity was high in northeast monsoon season and low in summer season. Phillipose (1960) suggested that a water body with alkalinity value greater than 100 mg/L seems to be rich in nutrients. The alkalinity values are generally, high due to outfall of sewage effluents and washing cloths etc. The total alkalinity was high in summer season in the present study, due to high rate of evaporation. Sehgal (1983) recorded total alkalinity, maximum during summer season and minimum during winter season in Shenala Lake.

Total alkalinity has shown the positive significance with the atmospheric temperature ($P<0.05$), water temperature ($P<0.05$).

Phosphate

Phosphate has often being suspected to be the limiting nutrient in the primary production of freshwater.

Phosphate in the surface water body is well established. Phosphates and other salts are prime contributors for the degradation of water quality. The formation of algal bloom, because of high concentration of phosphate.

The higher concentration of phosphate in the northeast monsoon season and low in summer season. Because of decomposition of plant materials releasing nutrients in the substrate and increasing the nutrient load of the system. Similar observations were noticed by Ayyapan and Gupta (1981), Khan and Khan (1985) and Vijaykumar (1991).

Phosphate has shown the positive significance with the atmospheric temperature ($P<0.01$), water temperature ($P<0.01$), total hardness ($P<0.01$), chloride ($P<0.01$), total dissolved solids ($P<0.01$).

Total dissolved solids

Total dissolved solids of water include all soluble materials in solution whether ionized or non-ionized. It does not include suspended sediments, colloids or dissolved gases.

The TDS showed higher values in summer season because of low level of water, due to evaporation (Shukla, 1992).

Total dissolved solids has shown the positive significance with atmospheric temperature ($P<0.01$), water temperature ($P<0.01$), total hardness ($P<0.01$),

phosphate ($P<0.01$).

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